



The EGRET Legacy: Setting the Stage for Fermi
Dave Thompson, NASA GSFC
CGRO 25th Anniversary of Launch



THE EGRET TEAM



NORMAN DOBSON STUART ALLISON PAT COGAN JIM RYAN, MIKE LYNCH, IRVEN ERRERA DON STILWELL, GUIDO PORRECA STAN HUNTER, MAX ALEKSANDROV, BILL DANIELS BOB HOFSTADTER BARRIE HUGHES JOE LEPETICH AL OPP, STEVE HOLT BERNIE KLEIN PAT COGAN, AL SMITH



DON BRIEL, JOHN ROGERS, CHARLIE ROSS ADAM THOMPSON CHARLIE CAMPBELL WESLEY McDONALD, WALT GOODALE RICK BERRY, GRETCHEN BURTON, KEITH OPPERHAUSER MAYER-HASSELWANDER, CORINNA MONTIGNY, PINKAU, SOMMER, HERTERICH, KANBACH TOM NOLAN, JOHN KODIS DAVE BERTSCH, CARL FICHTEL NAND LAL, EUNICE ENG, MARY ANN ESFARDIARI FRANK SHAFFER, HARRY TREXEL



RON HUNKLER, JIM WALL, JIM MING CARL HAEHNER, TOM HESLIN, CARROLL CLATTERBUCK EARL ANGULO ED SMIGOCKI, LEE HORNING DAVE THOMPSON, CARYL MITCHELL WARD HORNER, JIM CHESNEY SANDY ALSTON, PHIL SMITH BOB CUMMINGS, ART RUITBERG, ALAN LUKEMIRE JIM CHESNEY, BOB ROSS DAVID KNIGHT, PAT NOLAN



YEN LEE, JIM MING, JOE COLONY NANCY LAUBENTHAL BOB SMITH, BOB BAKER WALTER VIEHMANN DIANE KOLOS RUBY CUNNINGHAM BILL DANIELS CHARLIE EHLMANN G. KANBACH, I. PUTTLITZ, WIRTZ, AND KAMM WARREN WILLIAMS, MIKE DRURY BILL CAMPBELL



RAI AUBREY, BROOKE WEBSTER, SANFORD HINKAL AL BASS, BOB KICHAK, KEN YOUNG WALT ALLISON, LOIS PETTIT, DICK HOFFMAN FRED KREIS, JOE WONSEVER, VINOD PATEL DICK BOLT, RICK STICKLE BILL KENNEY ISRAEL MOYA, GREG CLARKE VIC OREM, DAVE STUDENICK STEVE DERDEYN, DON KNIFFEN DAVE KNIGHT

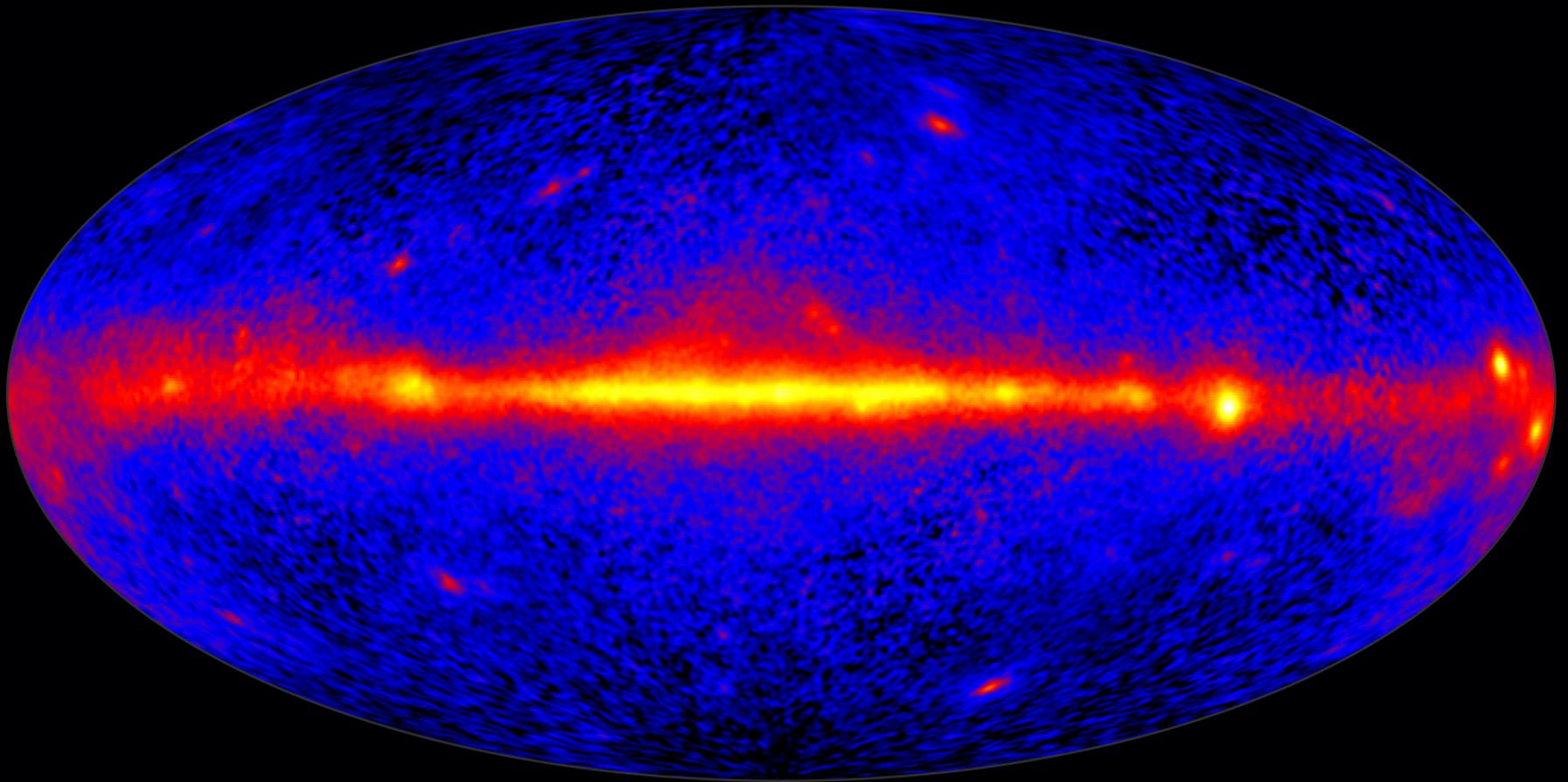


NORMAN DOBSON, STEVE HOLDER PAUL CLEVELAND RON MENTZER, DIANE RADSPINNER MOE BEAZLEY, BOB JOYCE, LOU NOORDZY CLAUDIA BREVARD ED SCHNEID DONNA PIRICH JIM LARGENT ALBERT ETIENNE TONY FAVALE BARRIE HUGHLÖCK Y.C. LIN ART WALKER ERIC OSBORNE

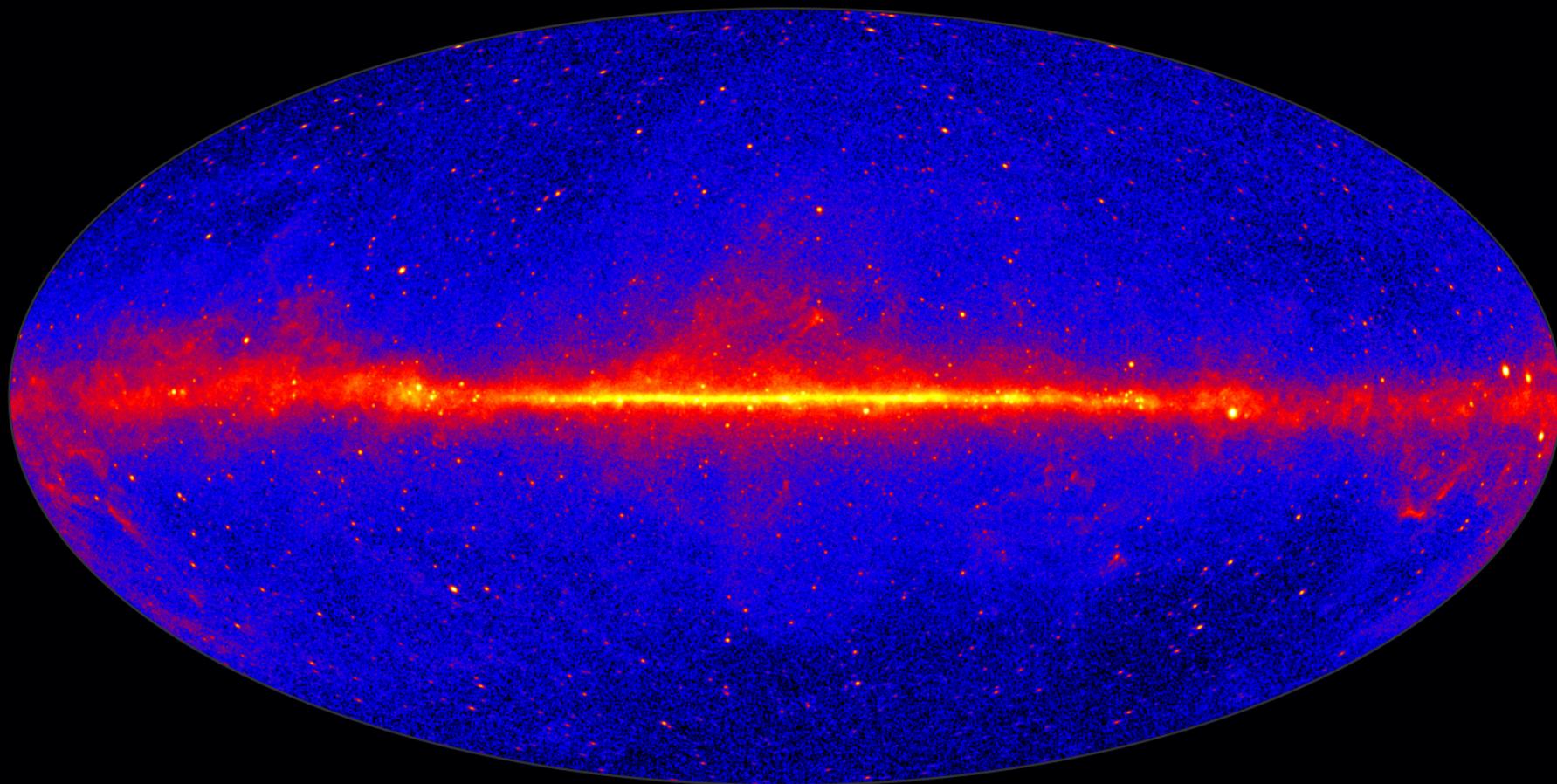


MIKE BARTHELMY, BRAD PARKER BOB CALLENS, JIM DYE, DOLF LEKEBUSCH BOB HARTMAN, MATTIE MOORING FRED GROSS ROBIN MAUK DON BOWER, KEITH BRENZHA, CHARLIE HARRIS CARL FICHTEL, GOTTFRIED KANBACH, PAT NOLAN JOANNE UBER, JANE JELLISON DICK HARNER BILL OSTAFF GIL COLON MATT MADIDA

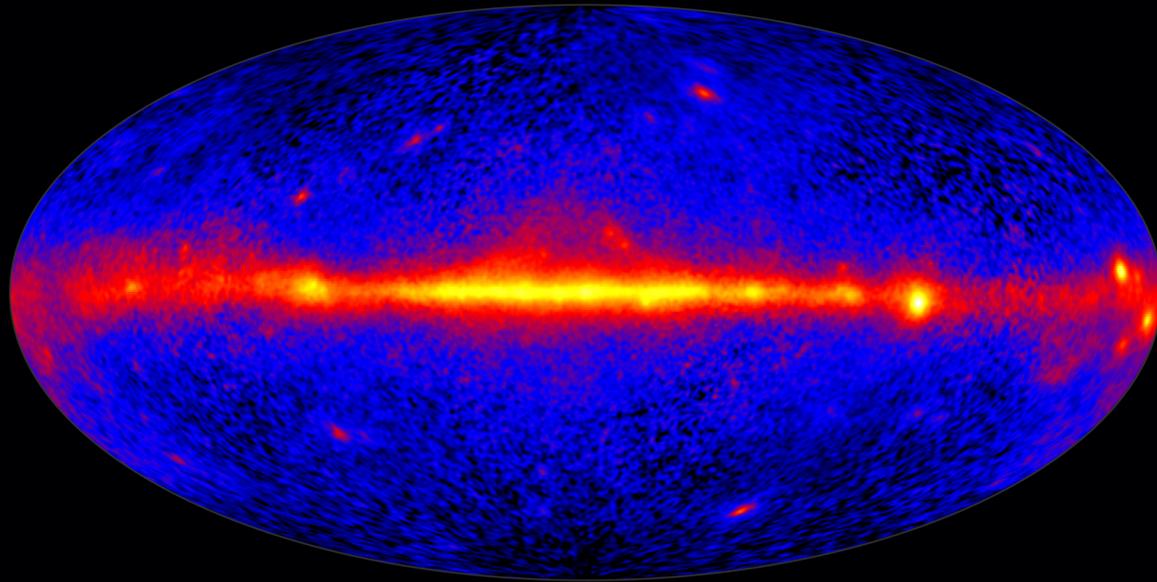




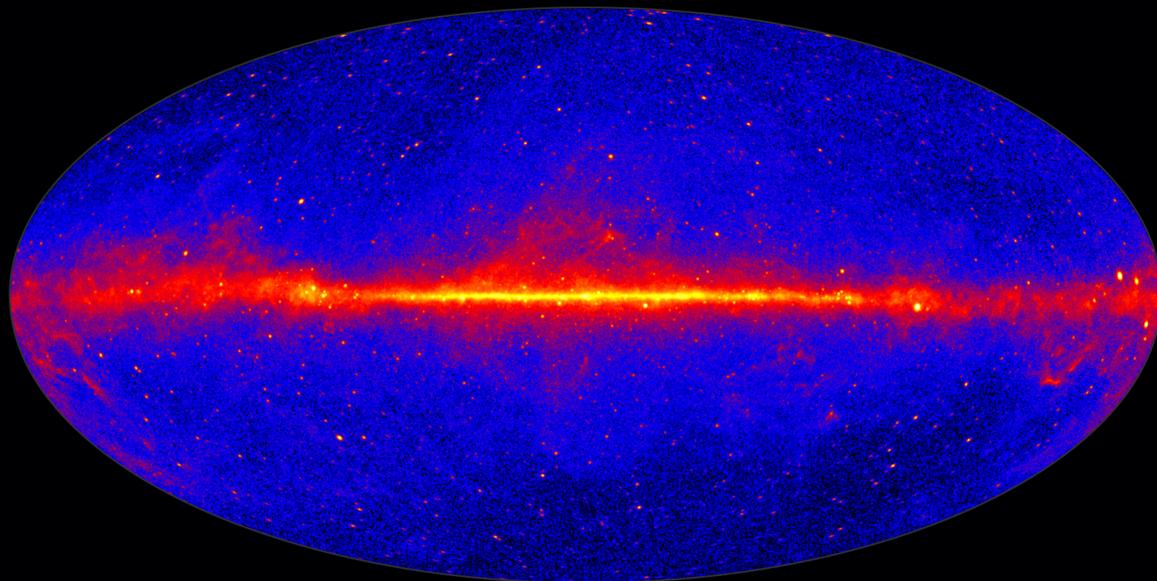
EGRET all-sky map of gamma rays above 100 MeV



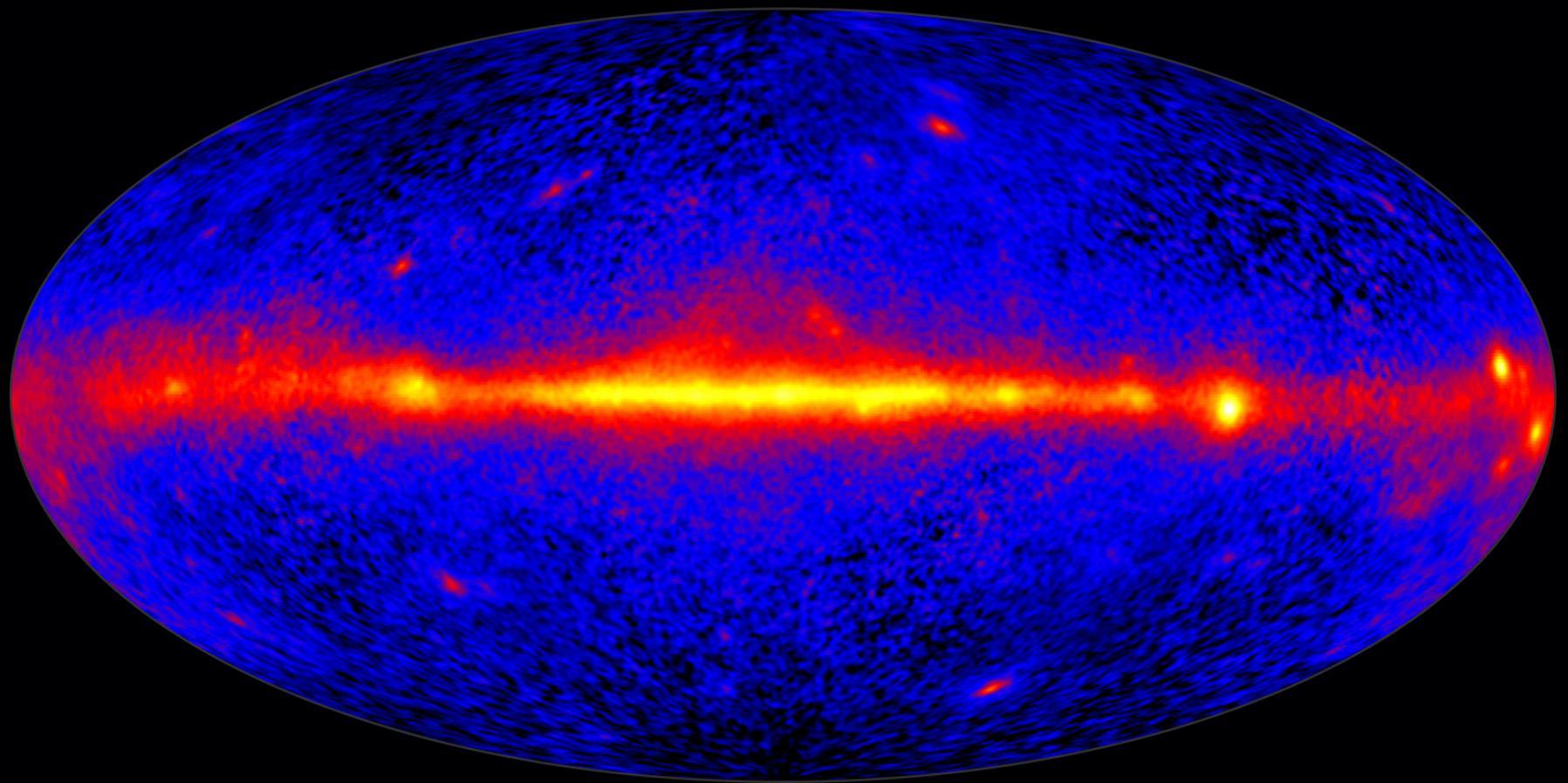
Fermi LAT 7-year all-sky map of gamma rays above 1 GeV



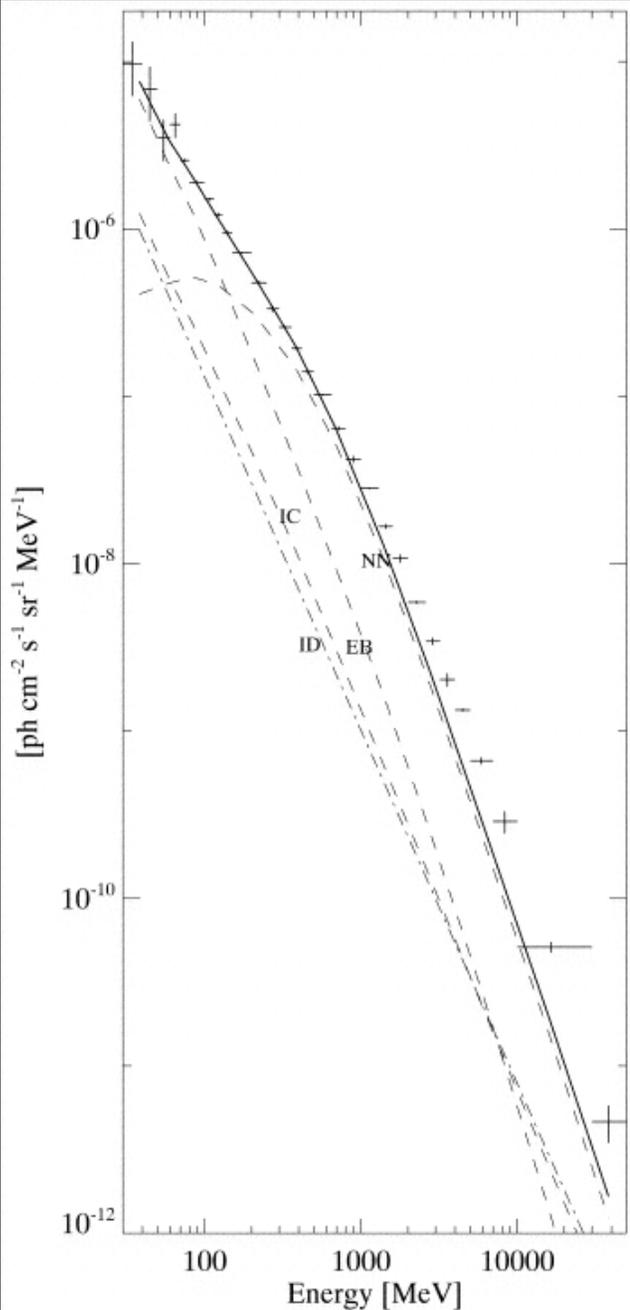
EGRET all-sky map of gamma rays above 100 MeV



Fermi LAT 7-year all-sky map of gamma rays above 1 GeV



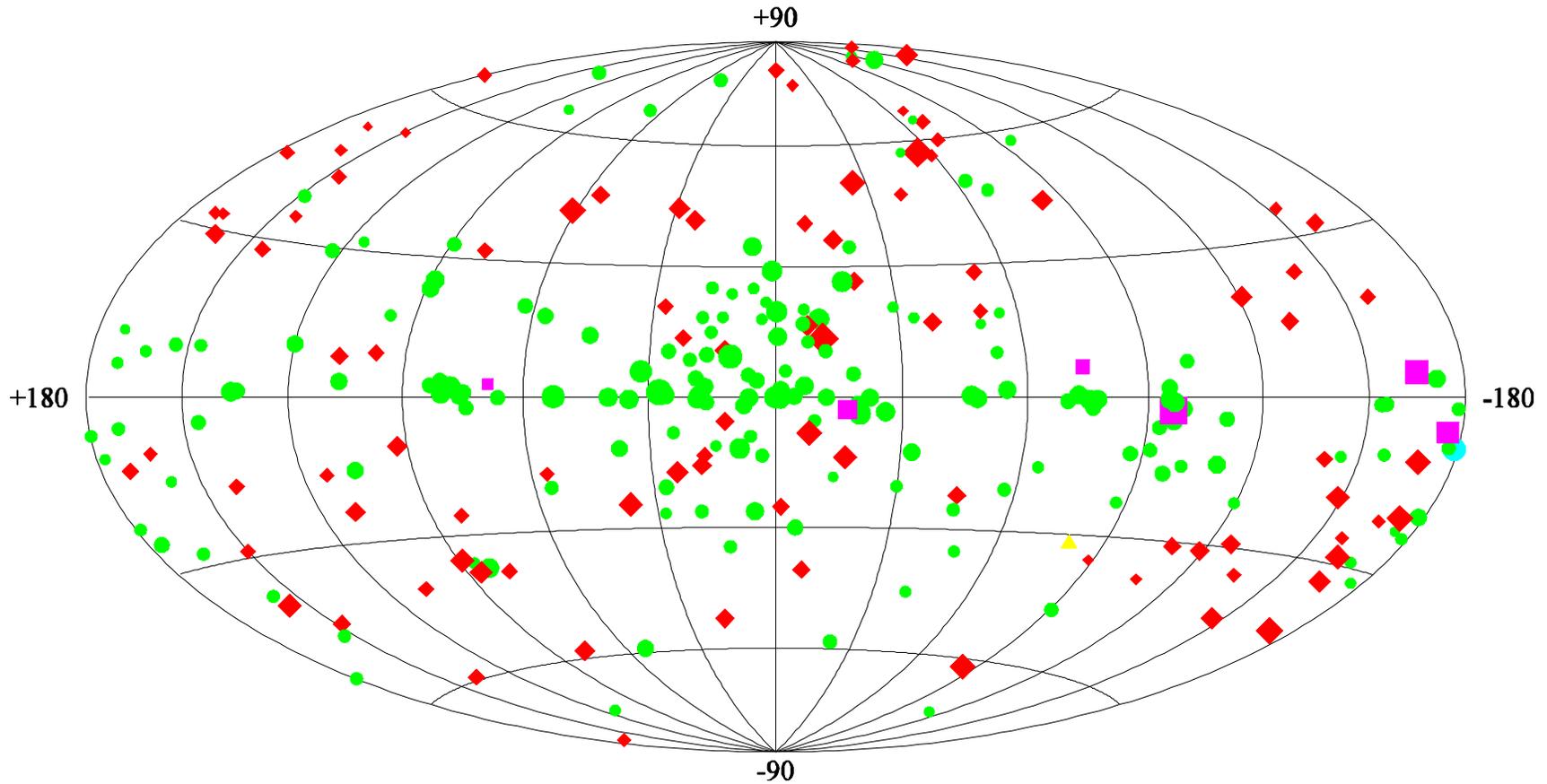
EGRET all-sky map of gamma rays above 100 MeV



Energy spectrum of the Galactic Center region, showing the curvature produced by the decay of neutral pions produced in cosmic-ray collisions with the interstellar gas (Hunter et al. 1997)

Third EGRET Catalog

$E > 100 \text{ MeV}$



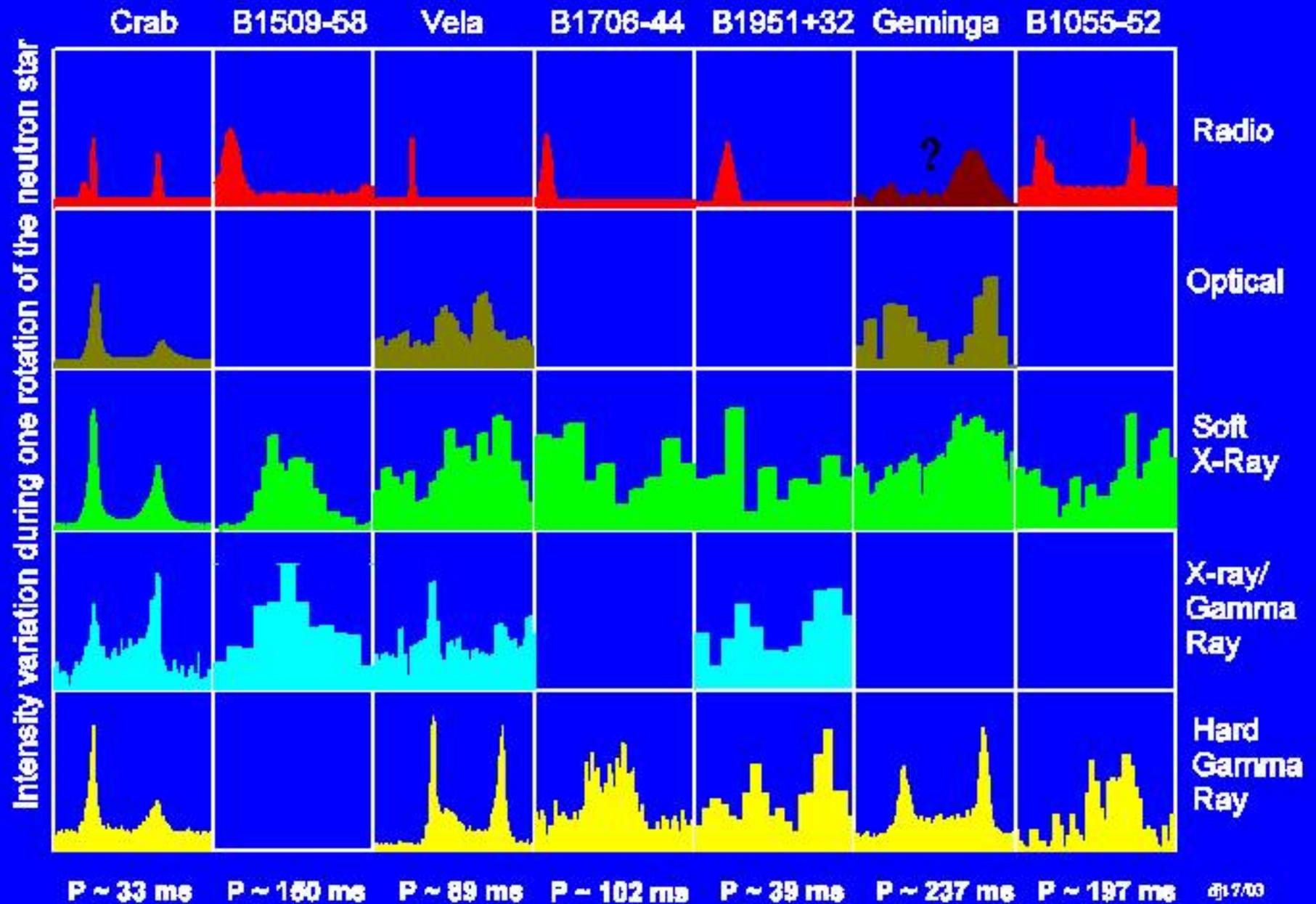
- ◆ Active Galactic Nuclei
- Unidentified EGRET Sources

- Pulsars
- ▲ LMC
- Solar FLare

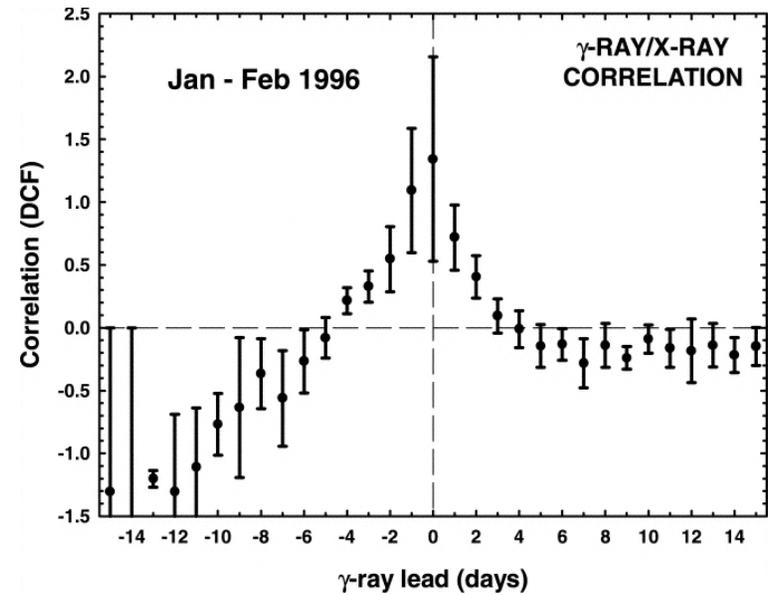
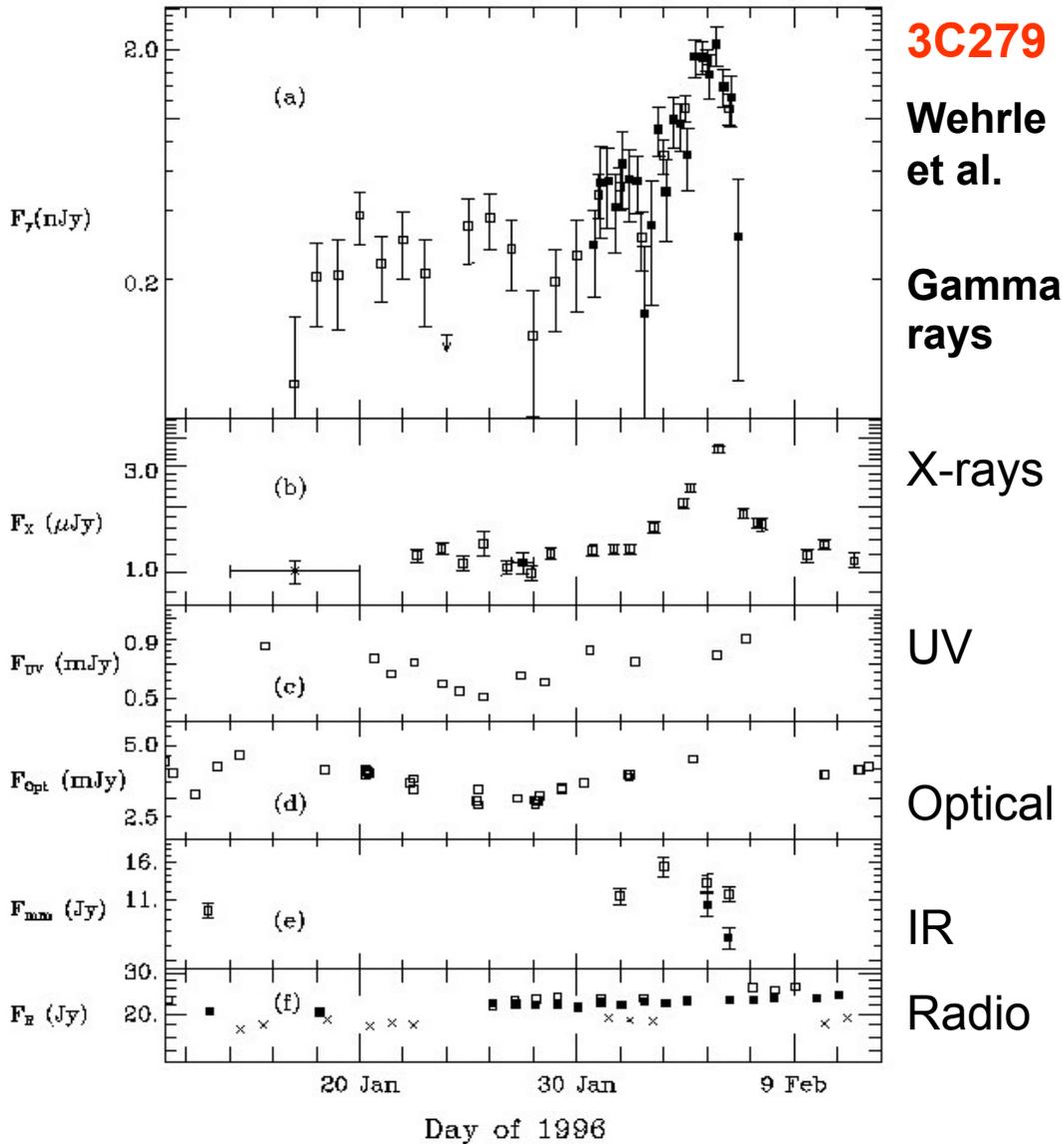
Hartman et al. 1999

271 Sources. Over half the total are unidentified

Variety in Pulsar Light Curves Emphasizes the need for Multiwavelength Studies



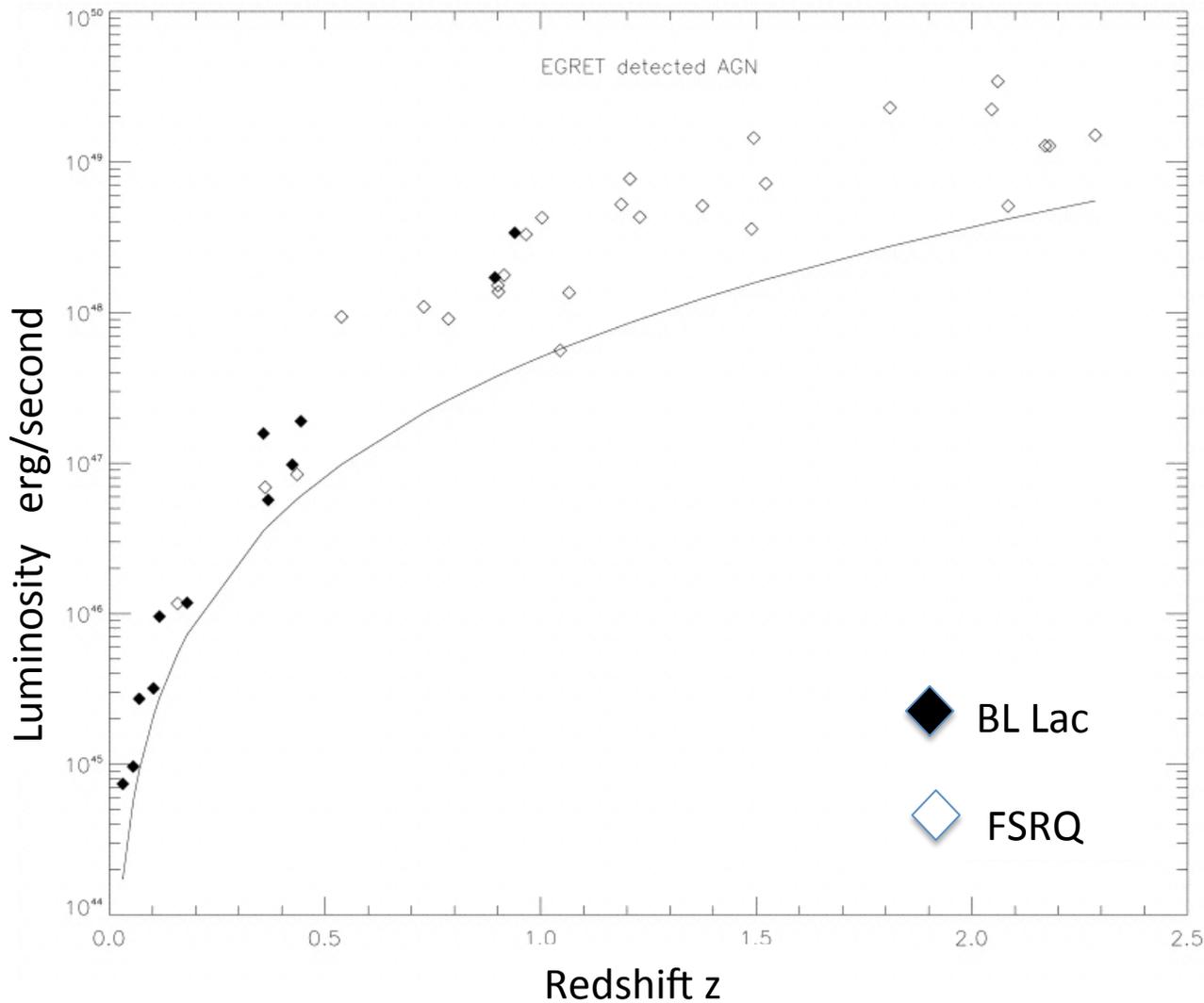
Multiwavelength Blazar Variability - 1996



Strong X-ray/gamma ray correlation with no lag

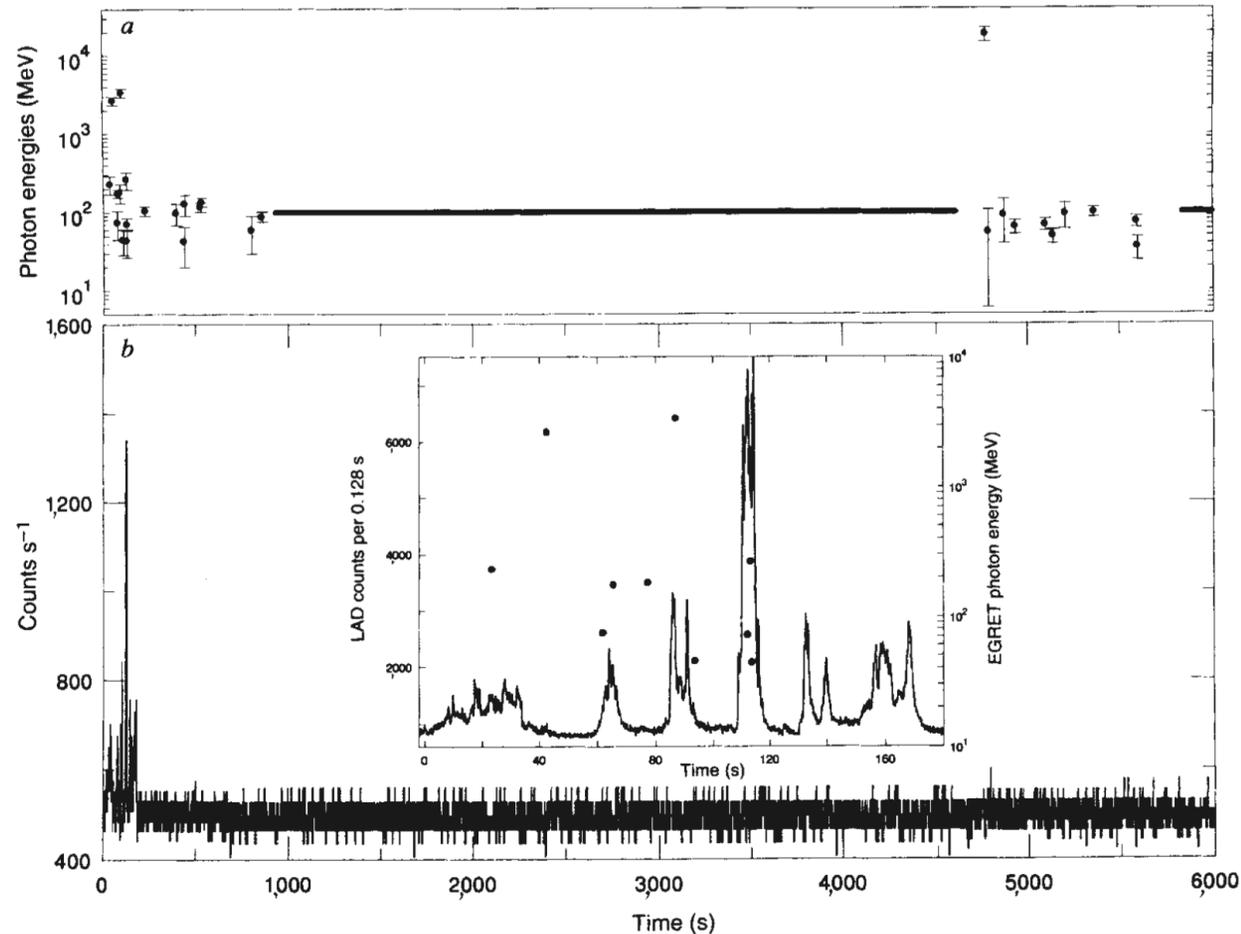
Hartman et al. 2001

Blazar Population Study



EGRET detected enough blazars to carry out a population study, showing that BL Lac objects are closer and have lower luminosity than Flat Spectrum Radio Quasars (Mukherjee et al. 1997)

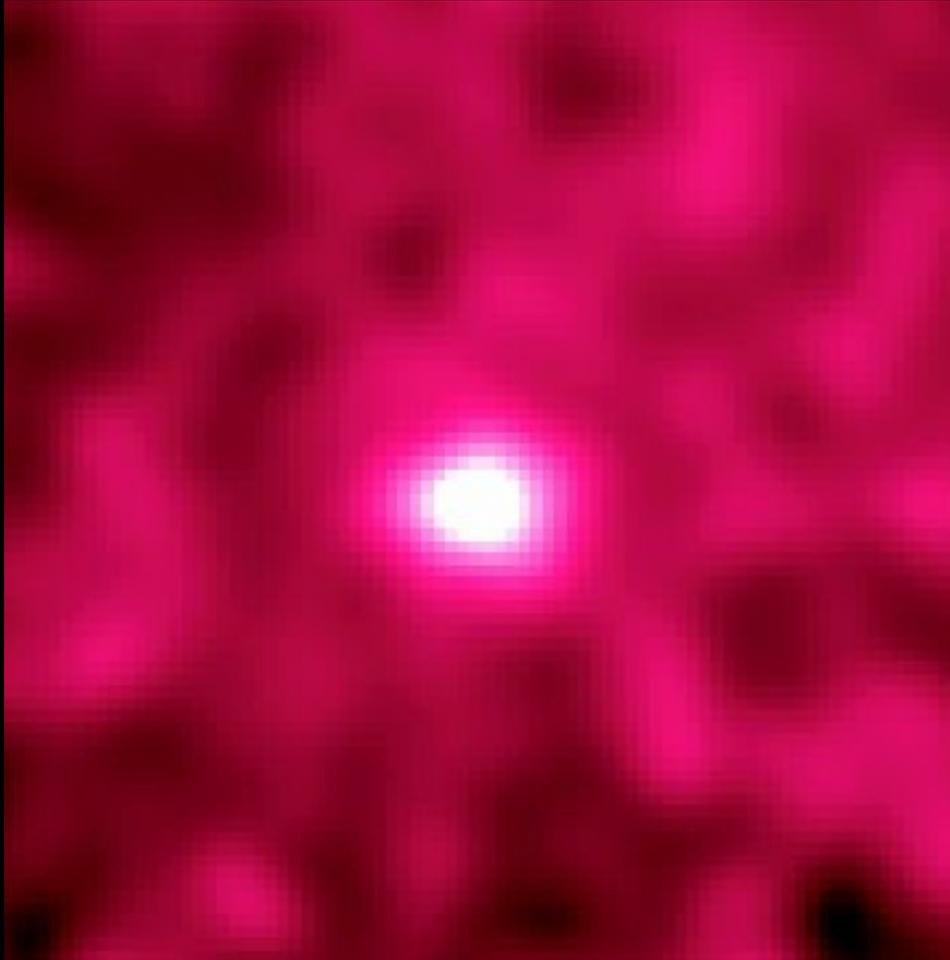
Gamma-ray Bursts



EGRET showed that gamma-ray bursts could have long-duration and multi-GeV emission (Hurley et al. 1994)

Much of the EGRET GRB analysis was done by Brenda Dingus.

Gamma rays from the Moon



EGRET detected the Moon as it moved through the EGRET field of view. These gamma rays come from cosmic rays hitting the lunar surface. In the EGRET energy range, the Moon is brighter than the quiet Sun (Thompson et al. 1997).

Some Other EGRET Results

- Supernova remnants like IC443 and W44 (tentative)
- Radio galaxy Centaurus A
- High-mass binaries LSI +61 303 and LS 5039 (tentative)
- Galactic Center
- Large Magellanic Cloud

Some EGRET Statistics

From the Astrophysics Data System:

Since 1986, there have been 2850 abstracts that mentioned EGRET.

The Third EGRET Catalog paper (Hartman et al 1999) has been cited by other papers nearly 1500 times.

The extragalactic diffuse paper (Sreekumar et al 1998) and the Galactic diffuse paper (Hunter et al 1997) each have over 600 citations.

Ten other EGRET team papers and 12 other papers based on EGRET have at least 200 citations.

SUMMARY

EGRET, designed for a two-year mission, operated successfully to the end of the nine-year Compton Observatory mission.

The EGRET results demonstrated the dynamic nature of the gamma-ray sky.

In addition to the important EGRET results on pulsars, blazars, gamma-ray bursts, and diffuse radiation, EGRET provided hints of some of the future discoveries to be made with Fermi.